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APPROACH TO THE FORMATION OF THE QUALITATIVE CHARACTERISTICS OF THE EMPLOYMENT POTENTIAL OF INDUSTRIAL ENTERPRISE

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Скрипник Н.А. Підхід до формування якісних характеристик трудового потенціалу промислового підприємства.

Розглянуто підхід до формування якісних характеристик трудового потенціалу (ТП) промислового підприємства (на прикладі його ділянки). Запропоновано використовувати їх в контексті ознак (початкових даних) для автоматичного розпізнавання класів рівнів ТП у відповідній інтелектуальній системі. Метою такої класифікації є виявлення «слабких ланок» ТП підприємства (що розглядається у вигляді складної системи) і формування відповідних керівних (корегуючих) дій на структуру і інші параметри ТП.

Ключові слова: трудовий потенціал, підприємство, класифікаційні ознаки, інтелектуальна система, автоматичне розпізнавання

Скрипник Н.А. Подход к формированию качественных характеристик трудового потенциала промышленного предприятия.

Рассмотрен подход к формированию качественных характеристик трудового потенциала (ТП) промышленного предприятия (на примере его участка). Предложено использовать их в контексте признаков (исходных данных) для автоматического распознавания классов уровней ТП в соответствующей интеллектуальной системе. Целью такой классификации является выявление «слабых звеньев» ТП предприятия (рассматриваемого в виде сложной системы) и формирование соответствующих управляющих (корректирующих) действий на структуру и другие параметры ТП.

Ключевые слова: трудовой потенциал, предприятие, классификационные признаки, интеллектуальная система, автоматическое распознавание

Scripnic N.A. An approach to quality descriptions of industrial enterprise of labour potential forming.

An approach to quality descriptions of industrial enterprise of labour potential (LP) forming is considered (on the example of his area). It is suggested to use them in the context of signs (basic data) for automatic recognition of classes of the LP levels in the proper intellectual system. The exposure of "weak links" of the LP enterprise (examined as a complex system) and forming of the proper managers (correcting) of actions on a structure and other parameters LP is the purpose of such classification.

Keywords: labour potential, industrial enterprise, quality descriptions, intellectual system, automatic recognition

In modern circumstance the socio-economic achievements of different countries more depend on a present human capital its main value consists in a capacity for creation and distribution of innovations; its part in national riches constantly grows and presents 64% in Japan and Germany arrives until 80% [1]. Strategic Ukrainian target is "taking such place in the world division of labor, international trade and finances, which would answer its natural, labour and intellectual resources, assisted achieving of the large European state" [2]. The question of personnel potential researching is devoted plenty of works [1-9].

World practice proves that a human capital becomes the most valuable resource in XXI century, mortgage of competitiveness, efficiency and economy growing. It gives a hope to Ukraine to attain the level of competitiveness of the European countries taking to account that our country before downstream was acknowledged by one of the super developed countries all over the world [5]. Except a naturally-resource the internal potential's constituent of territories development are economic, scientific, technical, innovative, labour potential. But naturally-resource potential degree and further development of economic, scientific, technical and innovative potential are impossible without corresponding development of personnel potential. The special value acquires development of personnel potential in such regions where subzero investment attractiveness exist and accordingly on every separate industrial enterprise.

The contemporary production level needs using the intellectual systems (IS) in different spheres. Appears the necessity of creation such system for automatic recognition of classes of personnel potential (PP) levels on enterprise (it can be examined as a difficult system), search and exposure of its "weak links", forming of the corresponding leading (corrective) operating on a structure and other parameters of PP. One of the important stages of creation such IS is forming of quality descriptions of enterprise's PP – signs of classes of PP levels.

Analysis of the last researches and publications

It said just entrepreneurial economy can successfully developing where special instrument of entrepreneurial activity is innovations only. Therefore to use the possibilities a country or region will be able only due to the purposeful forming of PP depended on natural capabilities, level of education and labour

activity which are predetermined the labour activity effectiveness.

First of all it should be noted success of strategic tasks realization at any management level (of country, of region, of enterprise) depends on providing the corresponding system strategic resources. The human capital is located on central place among problems of steady development decisions: it is pre-condition of such development, its method and ultimate goal at once [9].

For the effective economy growing of country it is necessity to development of creative human potential and activation the forming of high skilled labour force. Next to natural resources or accumulated capital a human capital is also valuable resource that provided a competitiveness, economy growing and efficiency of economic activity. A human capital is a necessary element and comes forward as an important factor of national riches' recreation in the conditions of transition to post industrial society. Economy growing, level and population life quality that are the important problem of forming of pre-conditions of steady development depend on investments into human capital efficiency [14].

Unsolved aspects of the problem

One among important modern economic systems' features of enterprises is gradual introduction in their structure of consulting and intellectual models. It is provided possibility of the periodic automated or automatic analysis of the state of enterprise from position of its competitiveness, degree of profitability etc. Necessity of such systems creation for the analysis of the state of enterprises' PP is fully obvious.

The most important stages of creation the mathematical and algorithmic providing of such systems is forming of informing attributes sets that represent (characterize) each of PP units (certain

specialist) or their subdivision from position of payment in the receipt of income an enterprise.

Thus the executed analysis of the known researches showed that one of important tasks of modern economy is forming of quality descriptions (signs) of PP of industrial enterprise for automatic recognition of its level in the corresponding intellectual system.

The aim of the article consists in development the approach to forming the quality descriptions of personnel potential of industrial enterprise as signs for automatic recognition of classes of PP levels in the corresponding intellectual system.

Research tasks are to investigate the selection of quality descriptions some from the PP signs of virtual subdivision of machine-building enterprise; to mean positions of their use in quality of signs for the automated or automatic recognition of PP level of enterprise and forming of recommendations on perfection of structure of PP.

The main part

In the article it proposed consider the selection of quality descriptions (signs) of PP among virtual subdivision of machine-building enterprise and as example there are workshops of one metal processing (table 1). There are signs (some of great number of significant signs chosen for demonstration develops this approach) of personnel divisions: age, educational degree and work experience (according to author's point of view they are the most informative).

In the article author proposes to analyze sets of signs and its dynamics during mentioned time interval driven in the table 1. According to age factor author done gradation on the next age groups: until 30 years; 31-40 years; 41-50 years; over 50 years.

The diagram of personnel quality age description (sign x_1) is presented on fig. 1.

Table 1. Some properties (characteristics) of personnel in area of metal-working shop

Quality characteristics and its classification			Years		
			2011	2012	2013
1. Age (x_1)	until 30 years	x_{11}	2	3	1
	31-40	x_{12}	2	4	9
	41-50	x_{13}	19	14	10
	over 50 years	x_{14}	2	4	5
2. Educational degree (x_2)	Middle	x_{21}	17	17	15
	Professional	x_{22}	6	6	8
	Master	x_{23}	2	2	2
3. Work experience (x_3)	until 5 years	x_{31}	2	2	3
	5-10 years	x_{32}	5	6	6
	10-15 years	x_{33}	3	3	4
	15-25 years	x_{34}	15	12	10
	over 25 years	x_{34}	1	2	2

Analyzing personnel quality age description of enterprise it is possible to draw conclusion that the most specific gravity on an enterprise is category "workers older 40 years". In 2012 workers older 40 years were 61,3% and young until 30 years in 2011 – 13,6%. On this enterprise pensioners occupied approximately 35%. The workers of middle group return considerably anymore then workers older 50

and pensioners. This index influences on the productivity of works' implementation.

The diagram of personnel educational degree (sign x_2) description is presented on fig. 2.

The diagram of personnel work experience description (sign x_3) is presented on fig. 3.

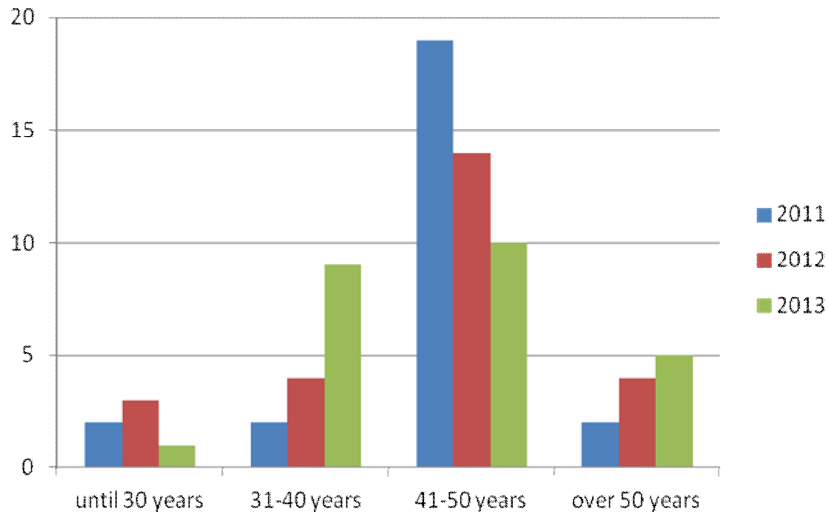


Fig. 1. Personnel quality age description (sign x_1) for 2011-2013 years

An expert analyze of data using tables (as a table 1) and acceptance of corresponding decisions about the state of subdivision PP and tendency of its dynamics will be quality at the less volume of selections.

The analysis of the state of enterprises' or industrial associations' PP with hundreds or thousands of specialists (for example – clusters [10]) needs using consulting and intellectual systems. One

of the stages of its creation is formalization and mathematical presentation of basic concepts, forming of informing signs and corresponding classes of PP (concordantly by the set criteria of analysis). A platform for this purpose is presentation of enterprise's PP as a difficult hierarchical system with the great number of connections and relations between its elements needed using vehicle of systematically technical [11].

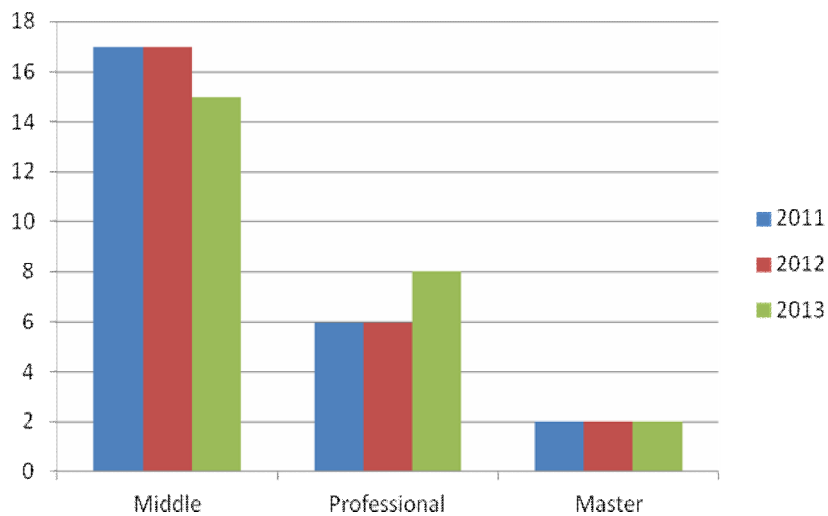


Fig. 2. Personnel educational degree description (sign x_2) for 2011-2013 years

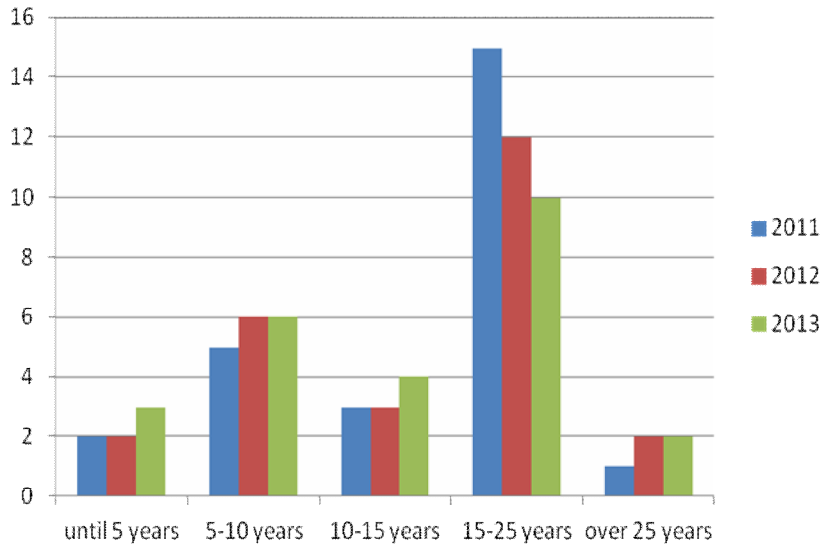


Fig. 3. Personnel work experience description (sign x_3) for 2011-2013 years

Let's show some of elements of forming quality descriptions of PP (on the data of table 1) and its mathematical presentation as signs for the automated analysis. It's considered the specialists of such professions like chief of subdivision, engineer, technologist, master, turner, milling-machine operator, locksmith, mechanic work at the workshop subdivision (table 1). Using denotations and structure of table 1 note that one virtual specialist (for example, 35 ages old, high educated master has 11 years work experience) is answered such set of signs:

$$x = (x_{12}, x_{23}, x_{33}). \quad (1)$$

For analyzed in a certain time of enterprise's existence set (great numbers of subdivisions) it is possible to write down:

$$x_p^{\tau_j} = \{x_{p/1}^{\tau_j}, x_{p/2}^{\tau_j}, x_{p/3}^{\tau_j}, \dots, x_{p/i}^{\tau_j}, \dots, x_{p/n}^{\tau_j}\}, \quad (2)$$

where $x_{p/i}^{\tau_j}$ – certain sign of PP;

n – amount of informing signs of PP selected among general amount using the special algorithms;

$p = \overline{1, k}$ – number (code) of certain subdivision

(for example, workshop) of enterprise;

k – amount of subdivisions on enterprise;

τ_j – date (or time interval, number) of implementation the current analysis (rating) of PP state;

q – total amount of PP state rating in period of enterprise's existence;

T – period of enterprise's existence (whether collecting data about enterprise's PP period).

It is possible to write down next:

$$\tau_j \subset T. \quad (3)$$

$$T \supset \{\tau_1, \tau_2, \tau_3, \dots, \tau_j, \dots, \tau_q\}. \quad (4)$$

Rating results can be presented by a set:

$$x_p^{\tau_1} = \{x_{p/1}^{\tau_1}, x_{p/2}^{\tau_1}, x_{p/3}^{\tau_1}, \dots, x_{p/i}^{\tau_1}, \dots, x_{p/n}^{\tau_1}\}. \quad (5)$$

$$x_p^{\tau_2} = \{x_{p/1}^{\tau_2}, x_{p/2}^{\tau_2}, x_{p/3}^{\tau_2}, \dots, x_{p/i}^{\tau_2}, \dots, x_{p/n}^{\tau_2}\}. \quad (6)$$

$$x_p^{\tau_3} = \{x_{p/1}^{\tau_3}, x_{p/2}^{\tau_3}, x_{p/3}^{\tau_3}, \dots, x_{p/i}^{\tau_3}, \dots, x_{p/n}^{\tau_3}\}. \quad (7)$$

$$x_p^{\tau_q} = \{x_{p/1}^{\tau_q}, x_{p/2}^{\tau_q}, x_{p/3}^{\tau_q}, \dots, x_{p/i}^{\tau_q}, \dots, x_{p/n}^{\tau_q}\}. \quad (8)$$

Using noted above information and taking into account analytical expressions (1–8) forming of personnel potential signs' space (P) is executed – on the base positions of works presented the theories of patterns recognizing [12, 13]. Chart presentation and example of development dynamics reflection of separate specialist (units of subdivision PP on enterprise) in corresponding signs' set space (state space, state structure) of size are presented on fig. 4.

In state space P set k classes (categories) of PP ($\Omega_1, \Omega_2, \dots, \Omega_k$).

Denotations:

$S_i^{\tau_1}$ – state vector (vector of quality descriptions,

signs of potential) of i -th specialist τ_1 – subdivision rating on enterprise;

$\Delta S_i^{(\tau_2 - \tau_1)}, \Delta S_i^{(\tau_3 - \tau_2)}, \Delta S_i^{(\tau_4 - \tau_3)}$ – sequence of potential changes' vectors (state) this specialist during developed time interval (for the corresponding sequence of rating).

Let's consider the case of analysis four from rating set of PP ($T \supset \{\tau_1, \tau_2, \tau_3, \tau_4\}$) in space on three signs ($x = (x_1, x_2, x_3)$) – according to table 1), for three classes of PP ($k = 3$).

Corresponding data is driven to the table 2.

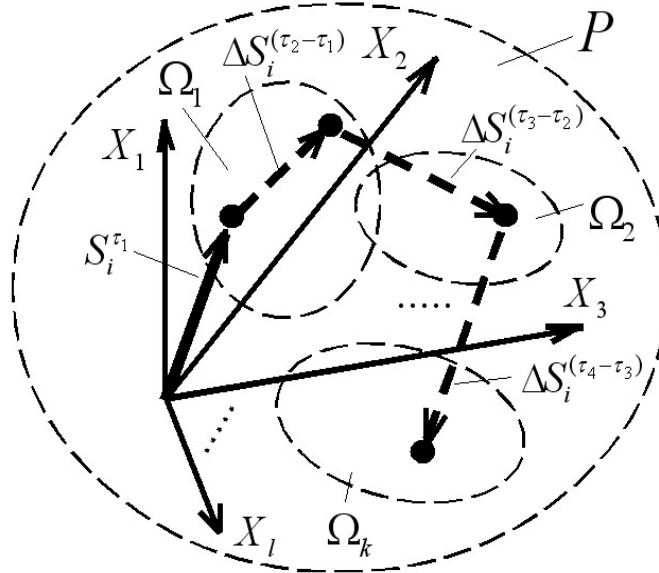


Fig. 4. Chart presentation of development dynamics (state, potential) of separate specialist (units of subdivision PP on enterprise) in corresponding signs' set space

According to table 1 in space of signs (P) will be certain 3 classes of PP:

Ω_1 – group of junior specialists (skilled workers, skilled and experienced workers);

Ω_2 – group of higher educated specialists;

Ω_3 – group of leaders.

Compatible analysis of table 1, 2 and fig. 4 allows to write down the following:

$$x^{\tau_1} = (x_{11}, x_{21}, x_{31}). \tag{9}$$

$$x^{\tau_1} \in \Omega_1 \tag{10}$$

$$x^{\tau_2} = (x_{11}, x_{22}, x_{32}). \tag{11}$$

$$x^{\tau_2} \in \Omega_1. \tag{12}$$

$$x^{\tau_3} = (x_{12}, x_{23}, x_{33}). \tag{13}$$

$$x^{\tau_3} \in \Omega_2. \tag{14}$$

$$x^{\tau_4} = (x_{13}, x_{23}, x_{34}). \tag{15}$$

$$x^{\tau_4} \in \Omega_3. \tag{16}$$

The state (status) dynamics selected for specialist analysis (taking into account expressions (9–16) answers such chain (sequences of changes) of PP classes:

$$\Omega_1 \Rightarrow \Omega_2 \Rightarrow \Omega_3. \tag{17}$$

Fully obviously such dynamics of unit of PP is fully positive (continuous intellectual increase accompanied by career increase). Recognition of stable potential growing (necessity – taking into account signs about the personal contribution to the receipt of income an enterprise) by intellectual system testifies this specialist is useful to the enterprise. In the system the program of future using of such specialist prognostication can be put on leading positions of enterprise of high level.

Table 2. Development dynamics of separate virtual specialist (units of subdivision PP on enterprise) date for presentation on three state signs space (according a table 1.)

Time interval rating	Age of specialist (years)	Inter-rating interval ($\Delta\tau_{i+1} = (\tau_{i+1} - \tau_i)$)	Vacant	Education
τ_1	20	–	Turner 1-th category	Professional (college)
τ_2	25	5	Turner 4-th category	Professional (college)
τ_3	32	7	Chief of subdivision	Master (university)
τ_4	41	9	Technologist	Master (university)

During recognition of increasing potential of specialist absence (for example rating status (potential) of specialist is constantly equal one class for the protracted sequence) he is hardly possible to consider perspective for an enterprise, so it should analyze exactly reasons.

Additionally to this note the features of enterprise's activity in new political, economic and social terms demand fundamentally new requirements to the workers, to organization and maintenance of their preparation and retraining, and also to permanent researches in area of quality descriptions of PP. Except direct influence on the financial results of enterprise capital investment in professional personnel development promote:

- 1) to creation of salutary climate in organization;
- 2) to motivate of employees and their devotion to organization;
- 3) to provide a management success.

Professional development influences on employees too.

Obtaining new skills and knowledge, promoting qualification at the labour market they become more competitive and get additional possibilities for a professional increase both into the enterprise and out. It is important especially in the modern terms of the rapid aging of professional knowledge [15]. Therefore it is necessity to constantly analyze PP of enterprise and its divisions, determine (to recognize) its quality descriptions, to develop recommendations to permanent development of personnel potential. Obviously it will assist intellectual, innovative potentials rising of enterprise.

Conclusions

1) Modern world tendencies publicly economic development is required observance of permanent and particular human development principles on global, macro-, microeconomic and personality levels.

On level of enterprise this context put the near-term solved tasks following:

- forming of quality PP description of industrial enterprise;
- development of human capital estimation methodology of enterprise taking into account the development features of corresponding type of economic activity;
- ground BSC indexes of human capital evaluation, which would provide realization of enterprise strategy;
- integration of human capital control system of enterprise into general management system;
- development of measures' determination mechanisms needed to increase of human capital of enterprise level and accordingly priority directions of investing.

2) The regulative measures of tip-management must be direct to activation of its PP forming and effective using.

It is necessary to do the comparative estimation of enterprises' PP on the basis of quantitative and quality description of personnel, potential increase measures and its transformation into intellectual capital, presence of strong corporate culture signs.

3) In the article approach to forming of PP quality descriptions sets of industrial enterprise as signs (initial data) for automatic recognition of PP levels classes corresponding intellectual system was worked out. An example of forming of PP problem, reflection of state (potential) of separate specialist dynamics in this space was made and the elements of the corresponding mathematical providing were expounded.

Author's opinion is: it will allow finding out the "weak links" of enterprise's PP and its subdivisions, form corresponding recommendations according to perfection of structure and level of PP.

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